De Platonicis Mythis. Thesim Facultati Litterarum Parisiensi. Proponebat *Ludovicus Couturat*. Paris: Felix Alcan. 1896. Pages, 119.

Sur une nouvelle méthode pour déterminer la chronologie des dialogues de Platon. Mémoire lu le 16 Mai, 1896, à l'Institut de France, devant L'Académie des Sciences Morales et Politiques. By *W. Lutoslawski*. Paris: H. Welter. 1896. Pages, 34. Price, 2 Fr.

The work of M. Louis Couturat forms a thesis presented to the Faculty of Letters at Paris. In examining the contradictions of the traditional conception of the Platonic doctrines, which students of the subject have left unexplained, the author has noted that the majority of the difficulties spring from the comparison of texts embodying mythical views with purely didactic passages of the Dialogues, and that consequently a criticism of the Platonic myths should precede every expressed interpretation of Plato's doctrines. Thus he has remarked that many passages which interpreters have taken as the dogmatic expression of Plato's thought, are obviously expressions of irony or allegory on the philosopher's part. To distinguish between the two species of expression, therefore, he has first subjected to scrutiny the actual myths of Plato, and with the criteria thus gathered has proceeded to the investigation of all anomalous passages, hoping to prove by his tests that the same are allegorical utterances. He has thus constructed from the actual myths a working allegorical vocabulary for the interpretation of Plato's veiled myths, and has found that God, the idea of divinity, the idea of reminiscence, the pre-existence and survival of the soul, all belong to this category. The circulation and perusal of M. Couturat's thesis will not be enhanced by its being written in Latin.

While upon this subject attention should be called to a little brochure by W. Lutoslawski, Professor at the University of Kazan, on a new method of determining the chronology of the Dialogues of Plato, being a memoir read in May last before the Institute of France. Professor Lutoslawski gives here a brief outline of his comprehensive labors in this field, which to the special student will be of undoubted interest. As Professor Lutoslawski is at work upon an English volume, to be published by Longmans, and containing the full elaboration of his views, it is unnecessary for us to say anything more than that his researches are based upon the stylistic differences of the Platonic Dialogues as corroborated by the method of "logical comparisons" treated in this memoir. μκρκ.

A MACHINE FOR SOLVING NUMERICAL EQUATIONS.

A curious machine for the mechanical solution of equations, invented by Mr. George B. Grant of Boston, Mass., is described in the *American Machinist* for Sept. 3, 1896 (New York: 256 Broadway), which is of considerable theoretical interest, and if the delicacy of its construction bears out its author's claims, is not without practical importance. Five scale-beams, pivoted on parallel sliding car-

riages vertically arranged and carrying negative and positive pans, have their right (positive) arms, AN, so jointed at variable points B as to act successively on one another. The *ratio* of the distances $AN/BN = x$ is kept uniform by means of a gearing, from the wheels of which through the carriage and guiding them run screws. This ratio is indicated on a graduated scale, having values from 1 to ∞, by a pointer attached to the fulcrum of the lower beam. Compounding the ratios of the jointed (positive) lever-arms we obtain the condition of equilibrium, and as the corresponding expression therefor, from the multiplication of four binomial factors, the typical equation of the fourth degree $\pm a x^4 \pm b x^3 \pm c x^2 \pm d x \pm e = 0$, the coefficients of which represent the weights to be placed in the respective positive and negative pans. The ratio of distances, or the root x of the equation, is then readily determined by turning a crank, being reached and indicated when the machine assumes equilibrium.

Since for x to be zero the distance BN would have to be infinitely great ($AN/BN = x$), the machine will not find roots approximating to zero; but this difficulty may be obviated by transformation. Also large roots cannot be determined with precision, for BN will have long passed below the limits of mechanical manipulation before x has attained very large values; in fact the distance between the values 1 and 2 on the scale is eight or nine times that between 16 and ∞. This also may be partly remedied by transformation. On the other hand, the machine does not require the multiple roots to be thrown out, nor that the co-efficient of the highest term should be either positive or unity. Also, since any beam may be left unweighted and hence the coefficient of the corresponding term reduced to zero, the machine will solve partial equations and consequently extract the roots of numbers representable in the common binomial form. The inventor claims it to be practicable to construct a machine delicate enough to find roots to two or three decimal places, so that the instrument might be used as a partial practical substitute for Sturm's theorem.

The free end of any beam, furnished with a pencil point, would trace a curve representing the equation. But the true equational curve must be indirectly produced. It is possible that with the appropriate mechanism, conquering the limitations of the machine, this curve might be directly traced; and it would then, at least for purposes of instruction, furnish a more powerful and certainly more graphic means of elucidating the equation than the scale. At the points of equilibrium the curve would cross the line of the abscissas and so indicate the roots measured on that line, we could see at a glance the character of the roots, etc. This geometrical method of investigating equations has a wide practical application and was beautifully presented a century ago by Lagrange, who even suggested an instrument for resolving upon this basis numerical equations of all degrees, without limitation of the positive or negative character, or magnitude, of the roots. It would be interesting to know if Lagrange's idea has ever been developed. (See the *Séances des Ecoles Normales* for 1794–1795.) T. J. McC.